

NANO2MC - Introduction

Introduction

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The programme trains in the multidisciplinary aspect of nanotechnologies and offers five specialisations:

- nanophysics: quantum phenomena, molecular transports, spintronics, simulation, physical characterisations, etc.;
- nanochemistry: synthesis of nanoparticles, chemical and physico-chemical characterisation, quantum chemistry, etc.;
- nanoelectronics: micro- and nanoelectronics, MEMS, NEMS, electronic characterisation, etc.;
- nanomaterials: nanocomposites, nanothreads, nanotubes, polymers, etc.;
- nanobiotechnologies: biomaterials, biophysics, nanomedicine, biosensors, etc.

Your profile

This programme is accessible to:

- holders of a master (120) in engineering sciences;
- holders of a master degree (120) in agronomic sciences and bioengineering, sciences, biomedical and pharmaceutical sciences, as well as holders of the academic degree of master in Business Engineering: upon application for admission;
- holders of Belgian and foreign second-cycle degrees: upon application for admission.

Your programme

In each of the specialisations, the training programme is composed of at least 60 credits.

This programme includes:

- a common core of 30 credits including a research work (thesis) done in a laboratory of one of the six institutions organising the Master (27 credits), transversal seminars and a personnel work (3 credits);
- a specialised training (8 to 15 credits);
- options in the form of courses of your choice (15 to 22 credits).

NANO2MC - Teaching profile

Learning outcomes

The Advanced Master in Nanotechnology offers holders of a basic second cycle degree complementary and/or advanced second cycle training in the fields of nanoscience and nanotechnology. It is intended for, on the one hand, those who do not have any training in this field and who wish to specialise in it, or on the other hand, for those who have already taken an option in this field during their Master's and who wish to further their training with a specialisation in another area of nanotechnology, e.g. an electrical engineer wanting to further his/her training in nano-biotechnology.

The Advanced Master in Nanotechnology is a program of 60 credits organised around five main areas of specialisation:

- nanophysics: quantum phenomena, molecular transportation, spintronics, simulation, physical characterisations ...
- nanochemistry: synthesis of nanoparticles, chemical and physico-chemical characterisation, quantum chemistry
- nanoelectronics: micro and nanoelectronics, MEMS, NEMS, electronic characterisation ...
- nanomaterials : nanocomposites, nanofils, nanotubes, nanomedicine, biocaptors ...

This program is also intended to train students in the multidisciplinary aspect of nanotechnology. To this end it puts the accent on the different approaches used in these fields : knowledge of basic phenomena at the nano level, nanomanufacturing or the synthesis of nanostructures, the characterisation of nanostructures and the modelling and numeric simulation at the nano level

It also aims to make students aware of the impact on society of nanotechnology by way of interdisciplinary seminars on the following themes : ethics, economic perspectives, applications of nanotechnology, toxicity of nanomaterials ...

On successful completion of this programme, each student is able to :

1. mener à son terme une démarche multidisciplinaire de recherche appliquée à la conception et à la fabrication d'un objet fonctionnel dont la taille se situe entre 1 et 100 nm et notamment d'être en mesure d'appliquer au moins deux des quatre compétences suivantes :
 - 1.1. utilisation des notions de phénomènes fondamentaux à l'échelle nanoscopique en vue de concevoir des objets et de matériaux aux propriétés nouvelles,
 - 1.2. synthèse de nanomatériaux ou fabrication de nanostructures fonctionnelles en laboratoire,
 - 1.3. caractérisation des nanostructures pour en connaître la structure et/ou des propriétés fonctionnelles,
 - 1.4. modélisation ou simulation numériquement à l'échelle nanoscopique, en utilisant des outils non-conventionnels, pour prédire des propriétés de l'objet, du matériau ;
2. appliquer la démarche complète de recherche au développement d'un objet fonctionnel dans l'un des domaines suivants : nanophysique, nanochimie, nanoélectronique, nanomatériaux, nanobiotechnologies ;

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3. estimer l'impact des nanotechnologies sur l'environnement, la santé, le développement économique, l'emploi ;

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4. organiser son travail de recherche, en équipe de laboratoire, pour le mener à bien
 - 4.1. formuler le cahier des charges du nanomatériau ou du nanodispositif,
 - 4.2. se documenter et résumer l'état des connaissances actuelles dans le domaine de recherche en nanotechnologie,
 - 4.3. mettre en forme un rapport de synthèse visant à expliciter les nouvelles propriétés de l'objet, du matériau, son domaine d'application,
 - 4.4. communiquer oralement et par écrit (sous forme d'article scientifique) les résultats de sa recherche à une équipe d'experts dans le domaine des nanotechnologies.

Programme structure

In each of the areas of specialisation, the program involves a minimum of 60 credits. This program comprises :

- a core curriculum of 30 credits consisting of
 - . a research work (thesis) carried out in a laboratory of one of the six institutions organising the Master's (27 credits)
 - . interdisciplinary seminars and an individual assignment (3 credits) : students follow seminars common to the various streams and do an assignment on some interdisciplinary themes such as ethics, economic perspectives, applications of nanotechnology, toxicity of nanomaterials ... ; these seminars are organised in turn by the program partners in the form of thematic days ; the interdisciplinary seminars are compulsory for all the streams and involve all the Master's students.

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The programme's courses and learning outcomes

For each UCLouvain training programme, a [reference framework of learning outcomes](#) specifies the the skills expected of every graduate on completion of the programme. Course unit descriptions specify targeted learning outcomes, as well as the unit's contribution to reference framework of learning outcomes.

NANO2MC - Information

Access Requirements

In the event of the divergence between the different linguistic versions of the present conditions, the French version shall prevail.

Decree of 7 November 2013 defining the landscape of higher education and the academic organization of studies.

The admission requirements must be met prior to enrolment in the University.

Unless explicitly mentioned, the bachelor's, master's and licentiate degrees listed on this page are to be understood as those issued by an institution of the French, Flemish or German-speaking Community, or by the Royal Military Academy.

In the event of the divergence between the different linguistic versions of the present conditions, the French version shall prevail.

SUMMARY

- [General access requirements](#)
- [Specific access requirements](#)

General access requirements

Translated from https://www.galilex.cfwb.be/fr/leg_res_01.php?ncda=39681&referant=l02

Art. 112. of the "Décret définissant le paysage de l'enseignement supérieur et l'organisation académique des études" :

§ 1. In accordance with the general requirements established by the academic authorities, students who have:

1. a master's degree;
2. an academic degree similar to the one mentioned in the preceding paragraph awarded by a higher education institution in the Flemish Community or the German-speaking Community, or by the Royal Military Academy, by virtue of a decision of the academic authorities and in accordance with any additional requirements they may establish;
3. a foreign academic degree recognised as equivalent to those mentioned in paragraphs 1 and 2 pursuant to this decree, a European directive, an international convention or other legislation, in accordance with the same requirements.

The additional admission requirements referred to in paragraph 2 are intended to ensure that the student has acquired the knowledge and skills required for the studies in question. When the additional admission requirements consist of one or more additional course units, these may not represent more than 60 additional credits for the student, taking into account all the credits that he or she may otherwise use for admission. These course units are part of the student's study programme.

§ 2. In accordance with the general requirements established by the academic authorities, a student who holds a title, diploma, degree or certificate of higher education, in the French Community or outside it, which does not grant him or her eligibility for admission to a specialised master's course by virtue of the preceding paragraph, may nevertheless be admitted by the jury of the course in question, in accordance with the additional requirements that it establishes, if the totality of the higher education that he or she has completed or the expertise that he or she has acquired is valued by the jury to be at least 240 credits.

§ 3. By way of derogation from these general requirements, the academic authorities may also admit to a specialised master's course holders of a title, diploma, degree or certificate awarded outside the French Community which, in that system of origin, grants direct eligibility for postgraduate studies, even if the studies sanctioned by these credentials are not organised into distinct degree courses or within a time period of at least five years.

Specific access requirements

Specific Admission Requirements

As several options in this programme are taught in English, no prior proof of proficiency in French is required. However, students with no knowledge of French may be refused registration if they choose options not taught in English. Students must state their level of proficiency in French in their application.

In accordance with the decree of 7 November 2013 defining higher education, promoting its integration into the European Higher Education Area and refinancing universities, the general admission conditions are set out on the "Admission conditions - Specialised Masters: <https://uclouvain.be/en/study/inscriptions/advanced-master-s-degree.html> (<https://uclouvain.be/en/study/inscriptions/advanced-master-s-degree.html>) web page.

The specific admission conditions to this program are as follows :

- 1) Access to the Advanced Master in Nanotechnology is unconditional for holders of a Master's degree of at least 120 credits in study area No.19 of the Sciences de l'Ingénieur : Master in Engineering (ir.) awarded by the French-speaking community of Belgium, as well as holders of a similar degree awarded by the Dutch-speaking community of Belgium.
- 2) Access to the Advanced Master in Nanotechnology is conditional for holders of a Master's degree with at least 120 credits in study areas No.18 in Agronomy and Bioengineering, No. 17 in Science, and No. 15 in Biomedicine and Pharmacy, awarded by the French-speaking community of Belgium, as well as the holder of a university degree awarded in the Flemish Community and declared by the

Management Committee to be similar to one of the above-mentioned degrees. The Management Committee decides on the basis of the application submitted by the student.

3) Access to the Advanced Master in Nanotechnology is conditional for holders of a Master's degree 120 other than those listed in 1) and 2), as well as holders of a second cycle foreign degree of at least 300 credits. The enrolment procedure is identical to that in 2).

Applications received will be subject to scrutiny by the program committee with a view to admission. The admission application should contain the following items :

- Motivation letter
- Complete resume
- Copies of the Bachelor and Master's degree or a document listing successful completion of the program
- All transcript of records of the Bachelor and Master studies testifying of the successful valorisation of 300 credits

A selection interview may be organised to make sure that the applicant properly masters the basic concepts needed for the study program.

A maximum of 15 credits of prerequisites may be imposed on candidates covered by points 2) and 3).

Special admission and registration procedures

Students who do not hold a Master's degree in Civil Engineering awarded in the French-speaking Community of Belgium must submit an application for admission to the Master's Management Committee (see above) at the time of their application, which will be assessed by the Master's Management Committee.

Holders of a Master's degree in Civil Engineering as described above obtained at a university other than the Université Catholique de Louvain must contact the Vice-Dean for Admissions at the Ecole Polytechnique de Louvain in order to obtain formal permission to enrol.

